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Heat Transfer and Flow Characteristics of Al2O3/Water Nanofluid in Various Heat Exchangers: Experiments on Counter Flow
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Abstract
On account of nanofluids influence on heat exchangers (HEs), a vigorous discussion can be made to concurrently contrast HEs to one another under the same conditions to detect maximum efficacy. Based on an extensive experimental study, this research is established to examine the effect of nanofluids on the performance of heterogeneous HEs with the same heat transfer surface area considering counter flow arrangement. A double pipe HE, a shell and tube HE and a plate HE are intended to accomplish the experiments. The experiments are executed under turbulent flow conditions using distilled water and Al2O3/water nanofluid with 0.2, 0.5, and 1% particle volume concentrations. From the results shown in the article, the double pipe HE revealed the best outcome for the heat transfer coefficient with a maximum enhancement of 60% while a maximum enhancement in the heat transfer coefficient of 11% was reported for the plate HE. Utilizing a nanofluid represented the lowest penalty in the pressure drop with a maximum enhancement of 27% for the plate HE while the highest penalty in the pressure drop with a maximum enhancement of 85% was observed in the double pipe and shell and tube HEs. © 2019, © 2019 Taylor & Francis Group, LLC.

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